

**ORGANIZATIONAL MAINTENANCE OF  
MULTIPLEXER SET AN/FCC-100(V)**

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MULTIPLEXER SET AN/FCC-100(V)

TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
Title Page.....		iii
Introduction to Organizational Maintenance of Multiplexer Set AN/FCC-100(V) .....	v	
Lesson 1: Preventive Maintenance Checks and Services (PMCS) of AN/FCC-100(V) .....	1	
Learning Event 1 .....	1	
Learning Event 2 .....	1	
Lesson Verification 1 .....	4	
Lesson 2: Organizational Maintenance of AN/FCC-100(V) .....	8	
Learning Event 1 .....	8	
Learning Event 2 .....	9	
Learning Event 3 .....	13	
Learning Event 4 .....	15	
Lesson Verification 2 .....	17	
Lesson 3: Troubleshooting Multiplexer Set AN/FCC-100(V) to Organizational Level .....	19	
Learning Event 1 .....	19	
Learning Event 2 .....	20	
Learning Event 3 .....	24	
Learning Event 4 .....	30	
Lesson Verification 3 .....	39	
Posttest.....	41	

US ARMY STRATEGIC MICROWAVE SYSTEMS REPAIRER  
MOS 26V SKILL LEVELS 1 AND 2

ORGANIZATIONAL MAINTENANCE OF  
MULTIPLEXER SET AN/FCC-100(V)

GENERAL

The organizational maintenance of Multiplexer Set AN/FCC-100(V) is part of the MOS 26V skill levels 1 and 2, is designed to teach the required knowledge needed to perform tasks related to maintenance of Multiplexer Set AN/FCC-100(V) at the organizational level. This subcourse is presented in three lessons, each lesson corresponding to learning objective(s) as indicated below.

Lesson 1: Preventive Maintenance Checks and Services (PMCS) of AN/FCC-100(V).

Task: Perform preventive maintenance checks and services of Multiplexer Set AN/FCC-100(V).

Conditions: Given an operational Multiplexer Set AN/FCC-100(V), tool kit, electronic equipment, and TK-101/G.

Standard: In accordance with steps presented in Lesson 1 of SOJT Extract, Organizational Maintenance of Multiplexer Set AN/FCC-100(V).

Lesson 2: Organizational Maintenance of AN/FCC-100(V).

Task: Perform organizational maintenance of AN/FCC-100(V).

Conditions: Given an operational Multiplexer Set AN/FCC-100(V), tool kit, electronic equipment, TK-101/G, SOJT Extract, and an air blower.

Standard: In accordance with steps established in Lesson 2 of SOJT Extract, Organizational Maintenance of Multiplexer Set AN/FCC-100(V).

Whenever pronouns or other references denoting gender appear in this document they are written to refer to either male or female unless otherwise indicated.

Lesson 3: Troubleshooting Multiplexer Set AN/FCC-100(V) to Organizational Level.

Task: Troubleshoot Multiplexer Set AN/FCC-100(V).

Conditions: Given a Multiplexer Set AN/FCC-100(V) containing a known problem, tool kit, electronic equipment, TK-101/G, SOJT Extract A: OPERATOR'S MAINTENANCE OF MULTIPLEXER SETS AN/FCC-100(V)1 AND AN/FCC-100(V)1X, and SOJT Extract B.

Standard: Troubleshoot Multiplexer Set AN/FCC-100(V) to organizational level in accordance with steps in SOJT Extract.

INTRODUCTION TO ORGANIZATIONAL MAINTENANCE  
OF MULTIPLEXER SET AN/FCC-100(V)

This booklet contains information and instructions for on-site organizational maintenance of Multiplexer Set AN/FCC-100(V).

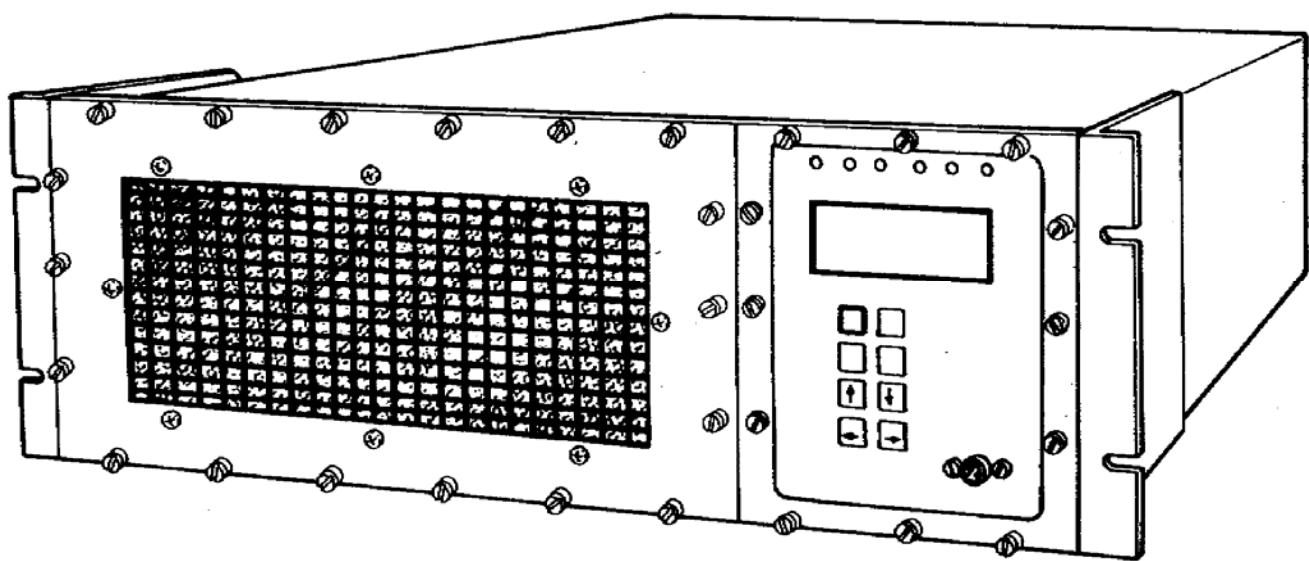


Figure 1. Multiplexer Set AN/FCC-100(V).

The information provides guidance on preventive maintenance checks and services, listing important performance data. The instructions cover preventive maintenance checks and services (PMCS), organizational maintenance, and troubleshooting of AN/FCC-100(V).

LESSON 1

PREVENTIVE MAINTENANCE CHECKS AND SERVICES  
(PMCS) OF AN/FCC-100(V)

Task: Perform PMCS of AN/FCC-100(V).

Conditions: Given an operational Multiplexer Set AN/FCC-100(V), tool kit, electronic equipment, TK-101/G.

Standard: Perform PMCS in accordance with steps in lesson 1, SOJT Extract B.

Reference: TM 11-5805-732-12

LEARNING EVENT 1:

1. Tools and Equipment Required. The tools and equipment required to perform organizational level maintenance of Multiplexer Set AN/FCC-100(V) include tool kit, electronic equipment, TK-101/G.

2. Preventive Maintenance - Consists of systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, reduce downtime, and assure that the equipment is performing to its maximum operational capability. Preventive maintenance consists of periodic inspection and checking of the equipment.

LEARNING EVENT 2:

1. Organizational PMCS.

a. The only three items to be inspected, when performing monthly organizational PMCS are as follows:

- (1) Built in test equipment (BITE) module LEDs.
- (2) Power supply fan filter.
- (3) Module access panel filter.

b. These checks and services are used to insure the AN/FCC-100(V) remains in good working condition at all times. If a problem is spotted that requires shutdown, it will be noted for future correction during scheduled downtime. If the problem detected would damage the equipment, stop operation immediately. Report any deficiency using the right form in accordance with TM 38-750.

NOTE: If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation; make complete checks when the equipment can be shut down.

2. PMCS Procedures. Routine services and checks like cleaning and dusting (front panel and module access panel) are done on a regular basis as required.

a. Inspection of BITE module LEDs.

- (1) Remove the module access panel of AN/FCC-100(V).
- (2) Observe that +5, -5, and -40 LEDs are on.
- (3) Observe that PC, ATC, ARC, MTC, and MRC LEDs are not on.
- (4) Reinstall the module access panel.

NOTE: Refer to table 2, learning event 3, lesson 3 for LEDs functions.

b. Inspection of power supply fan filter.

- (1) Remove power supply fan filter.
- (2) Clean if necessary.
- (3) Reinstall fan dust filter.

NOTE: Refer to paragraph 2b, learning event 1, lesson 2 for removal and cleaning procedures.

c. Inspection of module access panel filter.

- (1) Remove module access panel.
- (2) Clean filter.
- (3) Reinstall module access panel.

NOTE: For more information on removal and cleaning procedures, refer to paragraph 2a, learning event 1, lesson 2.

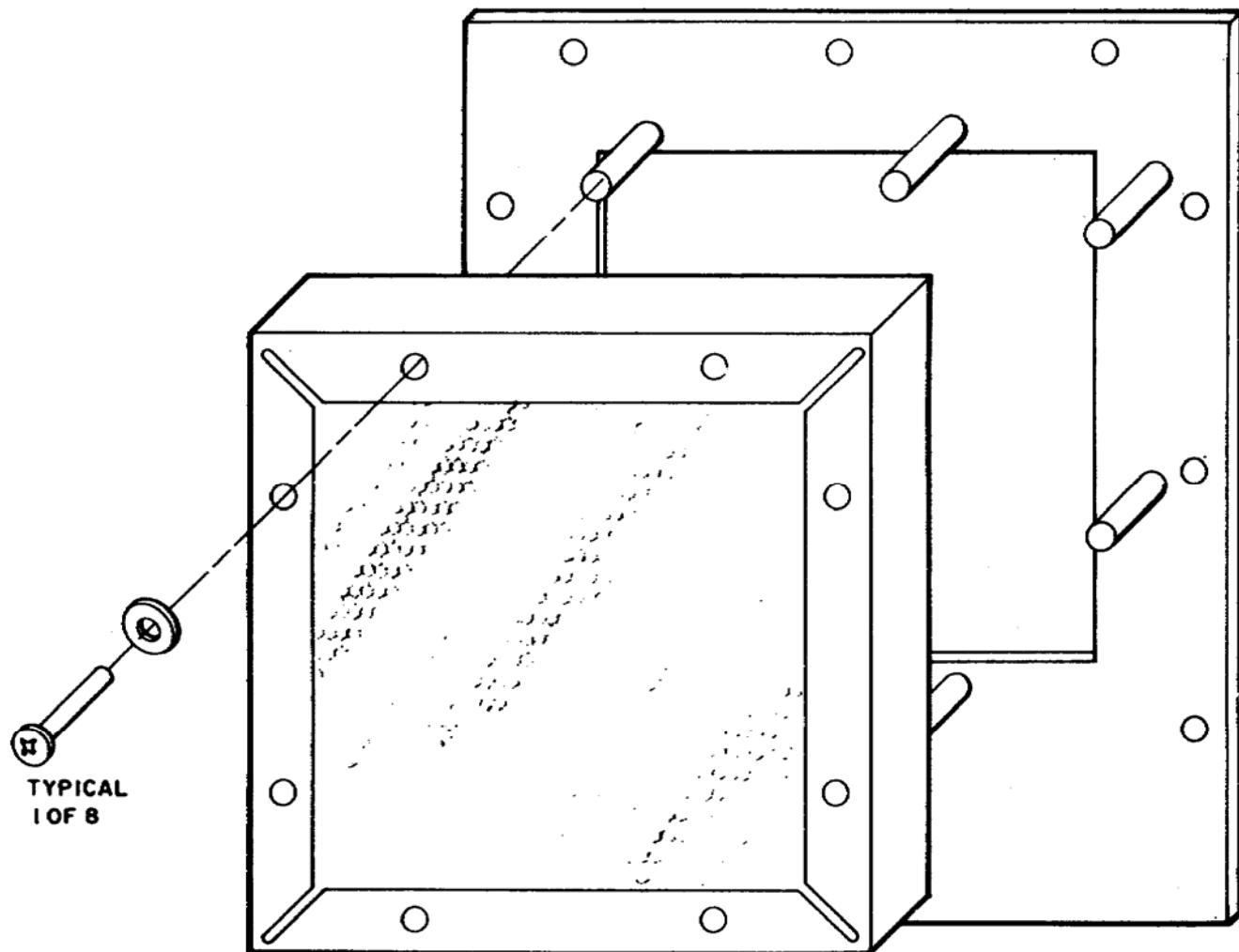


Figure 2. Power Supply Fan Filter Removal.

## LESSON VERIFICATION 1

### INSTRUCTIONS TO STUDENT:

This is a self-graded exercise to help you determine the knowledge acquired at this point of your training. You must answer eight questions, or more, correctly in order to achieve a passing score. There is no need for higher level supervision at this time, but your firstline supervisor will initial your completed work. You have 10 minutes to complete this lesson verification. You are authorized the use of TM 11-5805-782-12 and the information contained in this SOJT Extract B. The key answers to the following questions are located at the end of this exercise.

Circle the answer you select for each question.

1. The tools and equipment required to perform organizational level maintenance can be found in
  - a. TK-100.
  - b. TK-101/G.
  - c. TK-105/U.
  - d. None of the above.
2. Preventive maintenance consist of
  - a. systematic care, servicing, and inspection of the equipment.
  - b. visual inspections only.
  - c. dusting the equipment only.
  - d. None of the above.
3. The only item(s) to be inspected when performing PMCS is/are
  - a. BITE module LEDs.
  - b. power supply fan filter.
  - c. module access panel filter.
  - d. All of the above.

4. If a problem is found that requires shutdown, you should
  - a. contact operator level maintenance.
  - b. shut down the equipment.
  - c. have it noted for future correction during scheduled time.
  - d. remove the module access panel.
5. To report any deficiency, the right form must be used; TM \_\_\_\_\_ provides a listing of the appropriate form.
  - a. 11-5805-732-12
  - b. 11-5805-732-34
  - c. 38-750
  - d. 38-751
6. Routine PMCS such as cleaning and dusting (front panel and module access panel) are done
  - a. on a regular basis, as required.
  - b. only monthly.
  - c. only biweekly.
  - d. None of the above.
7. The inspection of BITE module LEDs requires removal of
  - a. front panel module.
  - b. power supply unit.
  - c. BITE module.
  - d. module access panel.

8. PMCS of the AN/FCC-100(V) includes inspection of the following items:

- a. power supply fan filter, BITE module LEDs, and module access panel filter.
- b. aggregate carrier module.
- c. power supply unit.
- d. None of the above.

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LESSON VERIFICATION 1 - ANSWER SHEET

1. b, paragraph 1, learning event 1, lesson 1.
2. a, paragraph 2, learning event 1, lesson 1.
3. d, paragraph 1, learning event 2, lesson 1.
4. c, paragraph 1, learning event 2, lesson 1.
5. c, paragraph 1, learning event 2, lesson 1.
6. a, paragraph 2, learning event 2, lesson 1.
7. d, paragraph 2, learning event 2, lesson 1.
8. a, paragraphs 2a, b, and c, learning event 2, lesson 1.

LESSON 2

ORGANIZATIONAL MAINTENANCE OF AN/FCC-100(V)

Task: Perform organizational maintenance of AN/FCC-100(V).

Conditions: Given an operational AN/FCC-100(V), tool kit, electronic equipment, TK-101/G, SOJT Extract B, and an air blower.

Standard: Perform organizational maintenance of Multiplexer Set AN/FCC-100(V) in accordance with procedures established in lesson 2, SOJT Extract B.

Reference: TM 11-5805-732-12

LEARNING EVENT 1:

1. In order to maintain the Multiplexer Set AN/FCC-100(V) in good operating condition, periodic cleaning of the air filters and replacement of the front panel, power supply and modules (located, behind the module access panel) is required.

2. Cleaning of Air Filter. Cleaning the air filters periodically is recommended to insure proper cooling air flow through the unit. Close supervision is required while performing this task.

CAUTION: Do not use compressed air above 29 psi for cleaning purposes. When trichlorotrifluorethane has been used, do not use compressed air for quick drying.

a. Cleaning module access panel filter.

- (1) Loosen all captive screws (18) that secure the module access panel.
- (2) Remove the module access panel.

CAUTION: Do not remove the filter from the panel.

- (3) Blow clean dry compressed air through the filter.
- (4) Reattach the module access panel and secure with captive screws.

b. Cleaning power supply fan filter.

- (1) Remove the screws (8) that attach power supply fan filter.

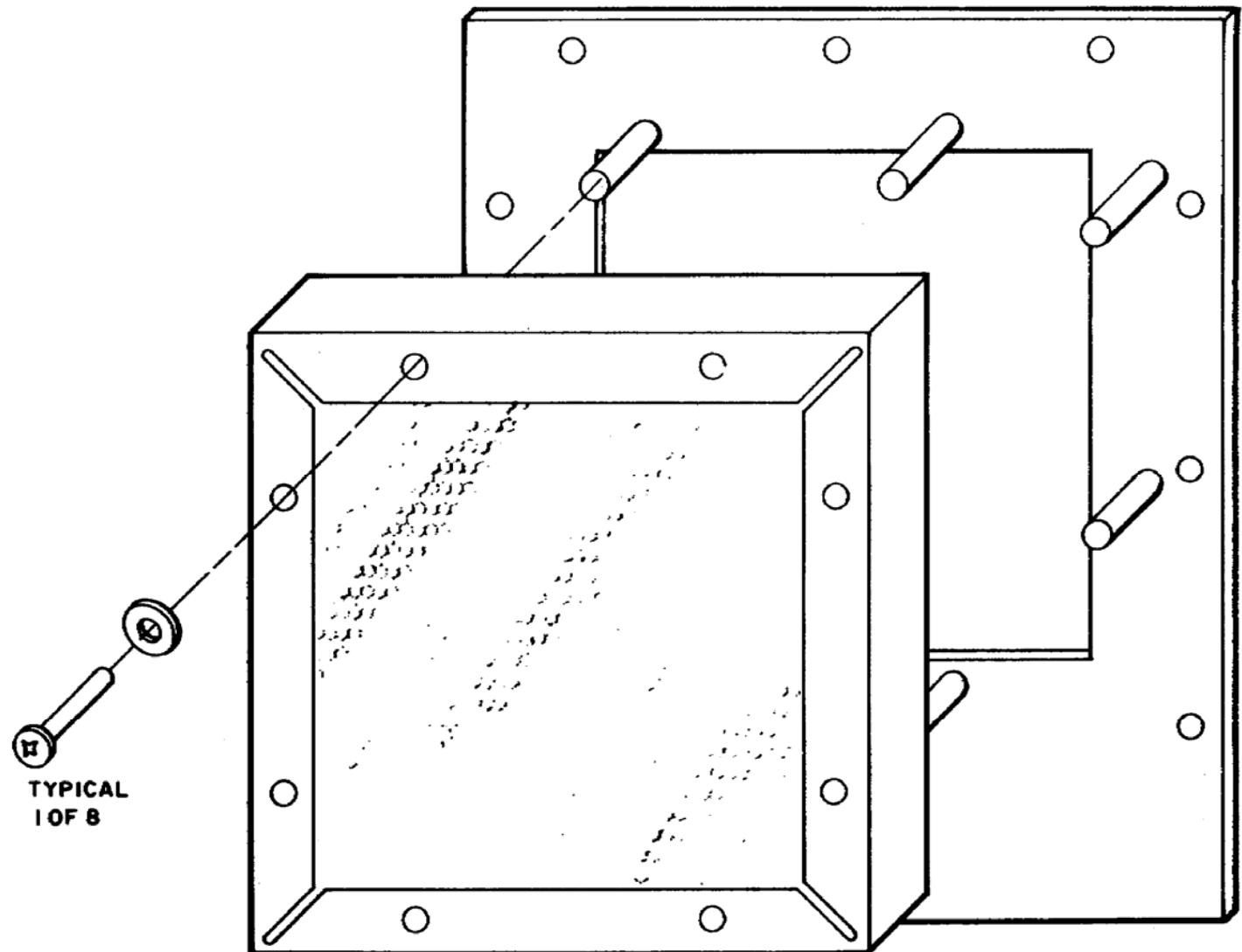


Figure 3. Removal of Power Supply Fan Filter.

- (2) Blow clean dry compressed air through the filter.
- (3) Reattach air filter.

LEARNING EVENT 2:

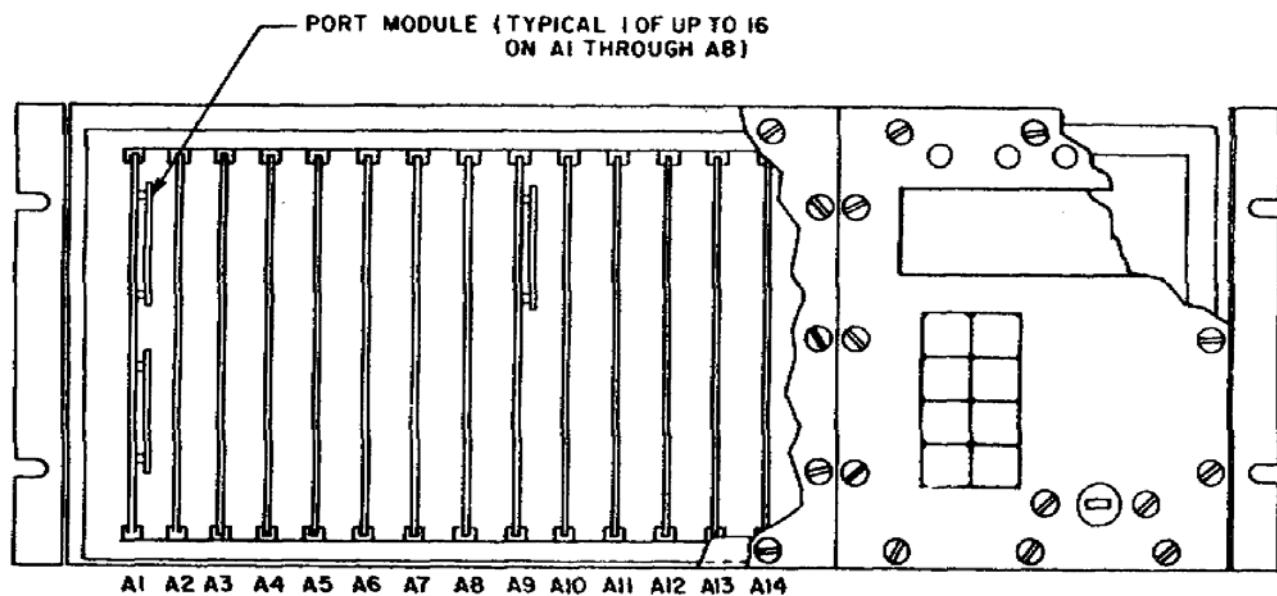
1. Removal of Modules.

CAUTION:

Removal of transmit processor, receive processor, shared logic, aggregate, aggregate carrier, or interface module will cause the AN/FCC-100(V) to stop operation. Close supervision is required when performing the removal of modules.

Replacement of shared logic module may result in a complete change of configuration. Installation of any shared logic module other than the one most recently removed might require configuration.

a. The Multiplexer Set AN/FCC-100(V) contains 14 common equipment modules and up to 17 user specified modules. These modules are located behind the module access panel.



NOTE:

MODULE ACCESS PANEL REMOVED

POSITION	MODULE
A1 THROUGH A8	PORT CARRIER
A9	AGGREGATE CARRIER (WITH AGGREGATE MODULE)
A10	TRANSMIT PROCESSOR
A11	RECEIVE PROCESSOR
A12	SHARED LOGIC
A13	BITE
A14	INTERFACE

Figure 4. Common Equipment Modules.

b. The common equipment modules plug into the AN/FCC-100(V) backplane. The user specified modules plug into the common equipment modules. All modules are removed from the front of the

multiplexer set. No tools are required. All modules can be removed while power is applied to the unit. It is recommended that power be turned off prior to removing any module other than port, aggregate, port carrier, or aggregate carrier modules.

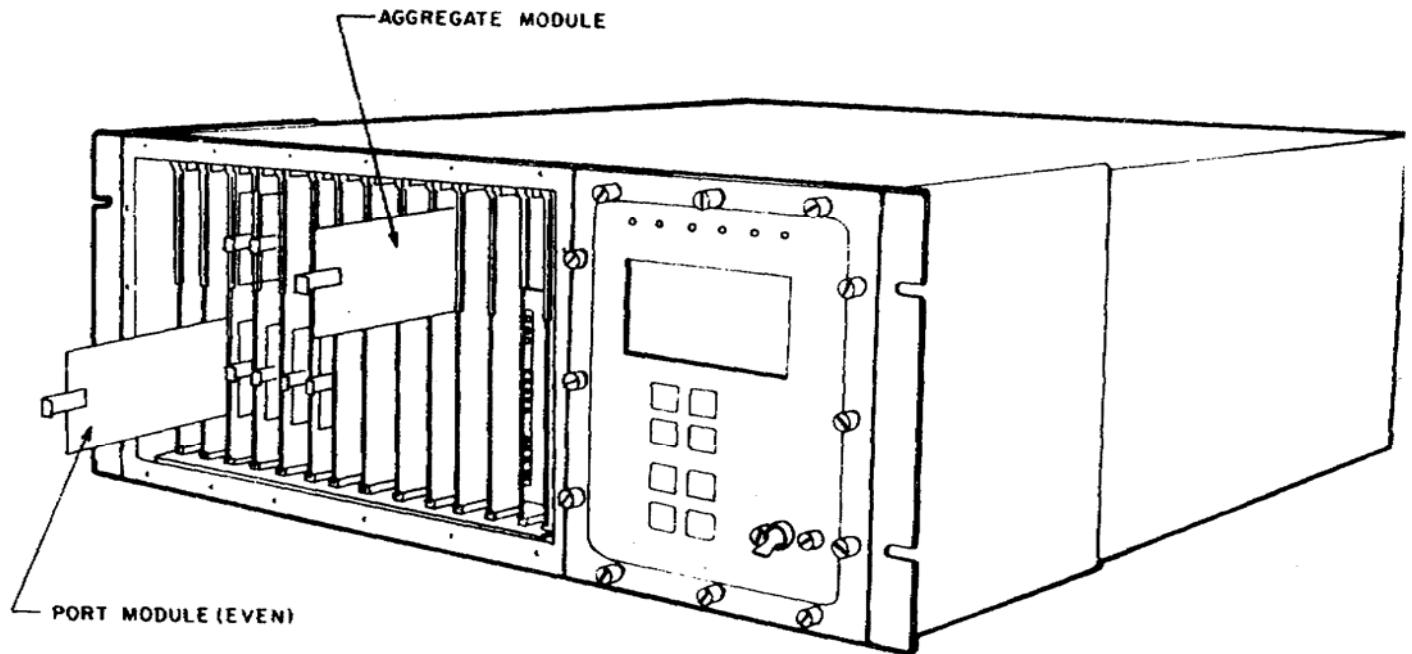


Figure 5. Removal of Port and Aggregate Modules.

(1) User specified modules. Each port carrier can have up to two port modules, but each aggregate carrier must have one aggregate module.

- (a) Remove module access panel.
- (b) Slide module from appropriate carrier module (see figure 5).

- (2) Common equipment modules, except interface.
  - (a) Remove module access panel.
  - (b) Raise extractor handle and pull module from unit.
- (3) Interface module.

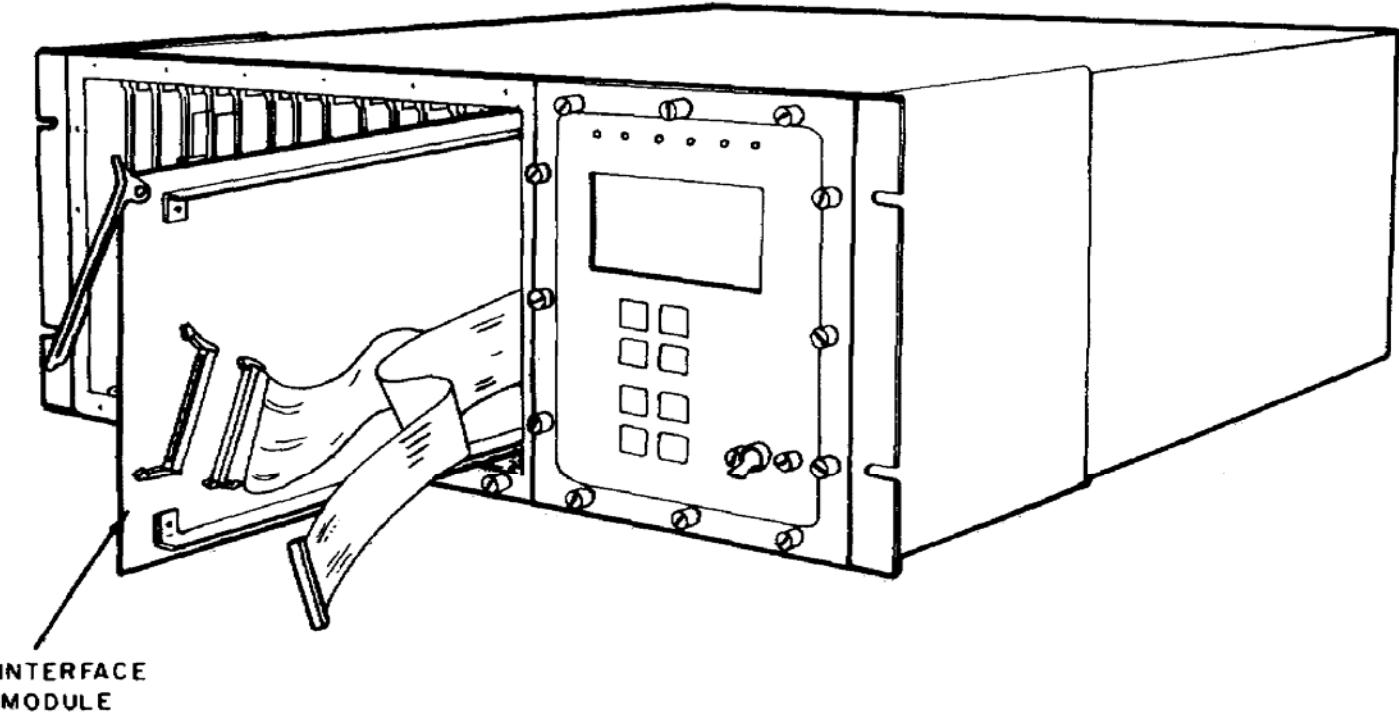


Figure 6. Removal of Interface Module.

- (a) Remove module access panel (see figure 6).
- (b) Raise extractor handle and slide module forward.
- (c) Disconnect and tag the two ribbon cable connectors that attach the module to the front panel.
- (d) Slide module out of the unit.

## 2. Replacement of Modules.

Modules can be replaced with the power on. It is recommended that the power be turned off before replacing modules other than port, aggregate, port carrier, or aggregate carrier modules. A power down/power up cycle is required after installation of transmit processor, receive processor, shared logic, aggregate carrier, and interface modules. Replacement of modules will be closely supervised.

- (1) Interface module (see figure 6).
  - (a) Set jumper straps if required, in accordance with paragraph 1a, learning event 3, lesson 2, SOJT Extract A.
  - (b) Slide module part way into A14 slot.

(c) Insure connectors are properly oriented and attach ribbon connectors to module.

(d) Lower extractor handle and push module securely into AN/FCC-100(V).

(2) Common equipment modules, except interface.

(a) Set jumper straps, if required, in accordance with steps in paragraphs 1b, c, and d, learning event 3, lesson 2, SOJT Extract A.

(b) Lower extractor handle and slide the module(s) into appropriate slot (see figure 4).

(c) Seat module(s) into backplane connector.

(3) User specified modules.

(a) Set jumper straps, if required, in accordance with paragraphs 2a and b, learning event 3, lesson 2, SOJT Extract A.

(b) Slide module into appropriate carrier module.

(c) Reattach module access panel.

LEARNING EVENT 3:

1. Removal of Front Panel.

WARNING: Hazardous voltages are present inside the AN/FCC-100(V) any time external power is connected. Be careful when operating the unit with the front panel removed. Supervisor will closely monitor this operation.

a. The front panel is an assembly consisting of a circuit card, alphanumeric display, key pad, and metal faceplate. The front panel is removed as an assembly and contains no components which are replaceable at the organizational level. The AN/FCC-100(V) can also be operated by a control terminal (if provided).

b. Remove front panel.

(1) Loosen all 14 captive screws securing the front panel.

(2) Slowly swing open the front panel.

(3) Remove module access panel.

(4) Raise extractor handle aid slide the interface module part way out of the AN/FCC-100(V).

(5) Disconnect and tag the two ribbon cable connectors that attach the front panel to the interface module.

(6) Slide the interface module back into the AN/FCC-100(V).

(7) Remove the screw and nut and disconnect the ground strap from the front panel to the chassis.

(8) Reinstall the screw and nut.

(9) Remove the two screws and flat washers that attach the front panel to the hinges.

(10) Remove the front panel and reinstall the screws and washers.

## 2. Replacement of Front Panel.

**WARNING:** Hazardous voltages are present inside the AN/FCC-100(V) any time external power is connected. Be careful when operating the unit with the front panel removed. Supervisor will closely monitor the performance of this task.

a. The Multiplexer Set AN/FCC-100(V) will operate when the front panel is removed. All operations (except test) may be performed, using a control terminal.

b. Installation of front panel.

(1) Attach front panel to hinges and secure with two screws and flat washers.

(2) Attach ground strap from front panel to chassis and secure with screw and nut.

(3) Slide interface module part way out of the AN/FCC-100(V).

(4) Observe proper orientation and reattach ribbon cable connectors to interface module.

(5) Slide interface module back into the AN/FCC-100(V).

(6) Secure front panel to the AN/FCC-100(V) with captive screws.

(7) Reattach module access panel.

## LEARNING EVENT 4:

### 1. Removal of Power Supply.

**WARNING:** Hazardous voltages are present inside the AN/FCC-100(V) any time external power is connected. Do not attempt to remove the power supply without removing external power. Supervisory assistance is required for completion of this task.

#### a. Safety steps.

(1) Turn off POWER switch on AN/FCC-100(V) front panel.

(2) Disconnect input power to AN/FCC-100(V).

#### b. Remove power supply.

(1) Loosen the 14 captive screws on the front panel.

(2) Swing open the front panel.

(3) Slide the power supply out of the unit.

### 2. Replacement of Power Supply.

**WARNING:** Hazardous voltages are present inside the AN/FCC-100(V) any time external power is connected. Do not attempt to install the power supply unless external power is off. Supervisory assistance is required for completion of this task.

#### a. Safety step. Insure that external power is not applied.

#### b. Install power supply.

(1) (AC power supply only.) Set power supply for correct voltage, 115 or 230 V AC.

(2) Slide power supply into the AN/FCC-100(V). Be sure that the module is properly seated.

(3) Close the front panel and secure the 14 captive screws.

(4) Insure that the POWER switch is OFF.

(5) Apply power to AN/FCC-100(V).

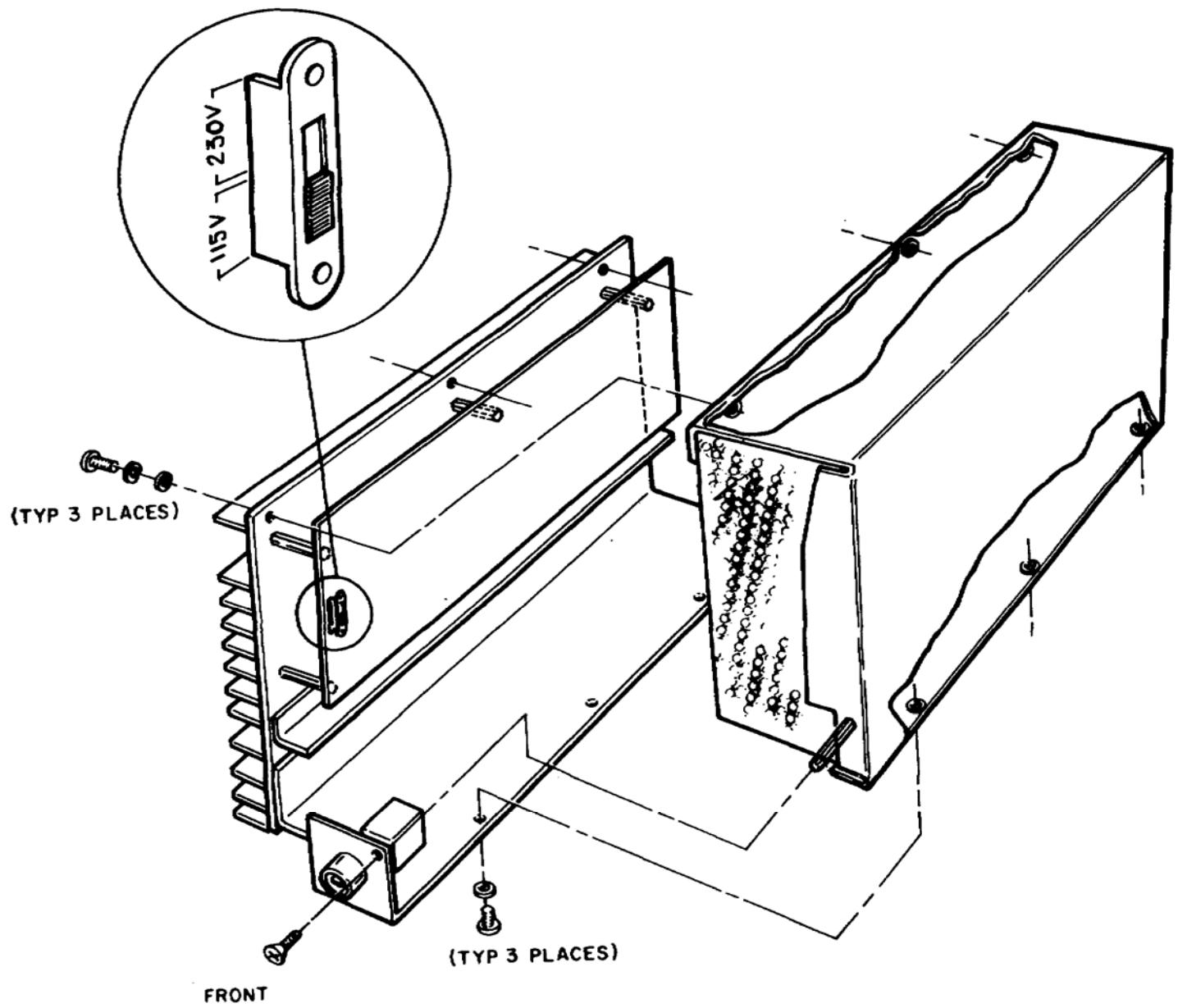


Figure 7. AC Power Supply Voltage Selection switch.

## LESSON VERIFICATION 2

### INSTRUCTIONS TO STUDENT:

The following exercise is performance-oriented. You will require close supervision in order to complete this exercise. Prior to completing this exercise, have your supervisor provide you the opportunity to perform the various organizational tasks presented in lesson 2. When you have mastered all the tasks, go ahead and complete the lesson verification. You are authorized to use SOJT Extract A and this subcourse booklet. You must perform three out of four tasks to be able to proceed to the next lesson. Have your supervisor read the next paragraph.

### INSTRUCTIONS TO SUPERVISOR:

Insure the individual has an operational AN/FCC-100(V) to practice the tasks in lesson 2 and that all conditions are met to accomplish these tasks. When the student has mastered the performance, have the individual complete this lesson verification. You must monitor every task closely to insure no mishap occurs. After completing each task, initial where indicated and have the student proceed to the next task. At the completion of lesson verification 2, have the student proceed to lesson 3.

Perform the following tasks in accordance with steps in lesson 2, SOJT Extract B.

1. Demonstrate the proper way of cleaning the air filters of
  - a. module access panel.
  - b. power supply fan.

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2. Demonstrate the proper way to remove and replace the following modules in accordance with lesson 2, SOJT Extract B.
  - a. User specified module (insure an unused port is selected).
  - b. Interface module (to prevent a drop in traffic, the individual can explain, orally, the steps he will go through to complete this task).

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3. Perform the removal and replacement of the front panel in accordance with lesson 2, SOJT Extract B.

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LESSON VERIFICATION 2 - ANSWER SHEET

1. Paragraph 2, learning event 1, lesson 2.
2. Paragraphs 1(1) and (3) and 2(1) and (3), learning event 2, lesson 2.
3. Paragraphs 1 and 2, learning event 3, lesson 2.

LESSON 3

TROUBLESHOOTING MULTIPLEXER SET AN/FCC-100(V)  
TO ORGANIZATIONAL LEVEL

Task: Troubleshoot Multiplexer Set AN/FCC-100(V) to organizational level.

Conditions: Given a Multiplexer Set AN/FCC-100(V) containing a known problem, tool kit, electronic equipment, TK-101/G, SOJT Extract A, and SOJT Extract B.

Standard: Troubleshoot Multiplexer Set AN/FCC-100(V) to organizational level in accordance with steps in SOJT Extract B.

Reference: TM 11-5805-732-12.

LEARNING EVENT 1:

Troubleshooting any piece of electronic equipment is a never ending task. It is a ramification of the constant maintenance procedures required to be performed, in order to keep a system functioning properly. The AN/FCC-100(V) is incorporated to a communications system. If any abnormal condition is observed, it is necessary to isolate the problem. By performing loopbacks in accordance with paragraph 3c, learning event 3, lesson 1, SOJT Extract A, one can isolate a problem to a portion of the communications system. If, after performing loopbacks, all indications point to an internal problem of the AN/FCC-100(V) perform the following steps.

- a. Insure that all input lines, such as data, control, and clock are properly connected to the AN/FCC-100(V).
- b. Perform a status check in accordance with paragraph 3a, learning event 4, lesson 2, SOJT Extract A. While data traffic continues, you can request the AN/FCC-100(V) to show which alarm conditions are present.
- c. Make any required changes to the AN/FCC-100(V) configuration. Sometimes it happens that major problems clear up when the proper configuration is established.
- d. The performance of the status check, will help you identify a defective module. Remove and replace any defective module identified through the status check.
- e. Repeat steps b, c, and d, above, until the status alarms have been corrected or identified.

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f. If the alarm condition still persists, perform a BITE check and display test in accordance with paragraphs 1 and 2, learning event 2, lesson 3, SOJT Extract B.

g. Remove and replace any module which fails a BITE check.

h. Repeat steps f and g until all bad modules have been replaced.

LEARNING EVENT 2:

1. Performing a BITE Check. The BITE check is a test of the Multiplexer Set AN/FCC-100(V) when initiated. In order to initiate a BITE check, the following steps must be performed.

CAUTION: A BITE check, when initiated, takes the AN/FCC-100(V) out of service and stops user data communications.

a. Using the front panel key labeled NEXT ENTRY, scroll to test mode. The front panel display will show:

TEST OUT  
OF SERVICE

b. Press the MODE SELECT key. The display will show:

CAUTION  
TEST

CAUTION will flash.

c. Press the DOWN ARROW key. The display will show:

CAUTION  
TEST

The first T in TEST will flash.

NOTE: The BITE check starts as soon as the STORE key is pressed. Do not press the RESTART key for at least 15 seconds.

d. Press the STORE key. All six front panel LEDs will light and remain on. The display will briefly flash WORKING. Then display will show:

TESTING

e. If any of steps a through d fails, go to learning event 3, paragraphs c and d.

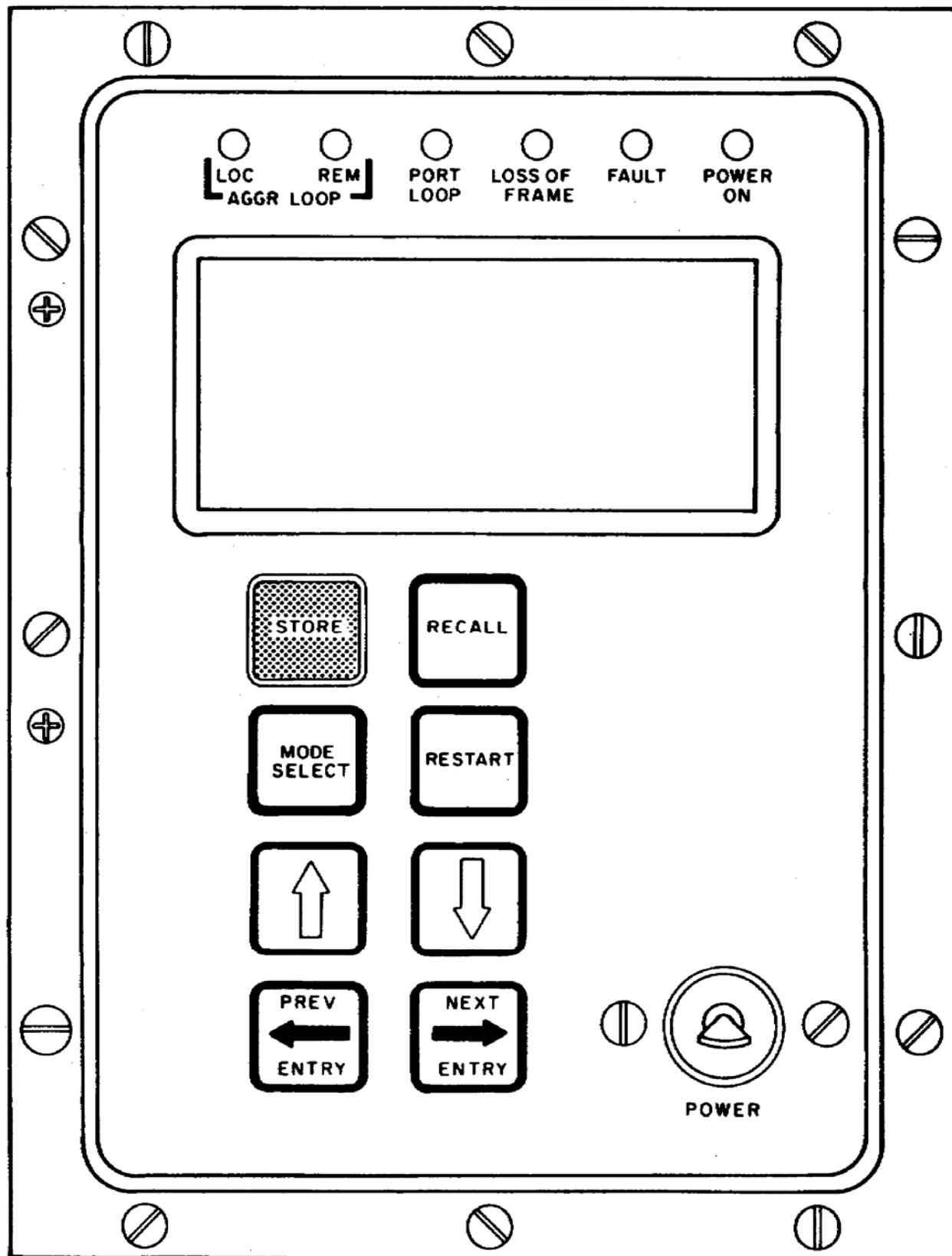


Figure 8. Front Panel Display.

2. Error Detection.

a. The BITE check will continue until either an error is found or the operator stops the check by pressing the RESTART key. If an error is detected, that error must be corrected before the BITE check can continue. It is not possible to bypass an error. If an error has not been found within 15 seconds, the BITE check is satisfactory. The BITE test will continue to run in a loop until a restart command is entered. During a BITE check, if a defective port carrier or aggregate carrier module is found, the display will show an error message for that module. The line below shows what a typical error message would look like:

REPLACE  
AX 03 4

b. This message indicates that the port carrier module in position 03 (the carrier module for ports 5 and 6) is bad. The second line of the display indicates which carrier module should be replaced. The last digit in the line indicates which test the module failed. AX 01 indicates that the carrier module for ports 1 and 2 is bad; AX 02 indicates that the carrier module for ports 3 and 4 is bad, etc. AX 09 indicates the aggregate carrier module for the aggregate module is bad. The BITE check does not detect error(s) in individual port or aggregate modules.

c. An error message, during a BITE check, indicates the presence of a defective carrier module in a particular location. When a carrier module has been replaced, the port or aggregate module from the defective carrier module can be reinstalled in the new carrier module.

NOTE: Before installing a replacement carrier module, the strapping must be set correctly.

3. Display Tests.

a. The display tests allow an operator to verify proper functioning of all front panel keys and each segment of the display window. The display tests can only be performed when a BITE check is running. If an error is found during a BITE check, all the keys on the front panel, except RESTART, will be disabled. No further display testing can be performed unless a new BITE is started. Table 1 shows the display tests.

Table 1. Display Tests.

Key	Operation/Test	Window
	Displays alternating pattern of * and O's.	*0*0*0*0*0*0 *0*0*0*0*0*0
	Causes display to flash.	
	Places *'s in top row and O's in bottom row.	***** 000000000000
	Places O's in top row and *'s in bottom row.	000000000000 *****
	Checks complete 64 symbol ASCII character set (upper case letters plus numbers and symbols).	ABCDEFGHIJKLM NOPQRSTUVWXYZ
	Scrolls the display through the character set. Each keystroke advances the display by one symbol.	ABCDEFGHIJK LMNOPQRSTUVWXYZ
	Scrolls the display through the character set. Each keystroke steps the display back by one symbol.	BCDEFGHIJKLM NOPQRSTUVWXYZXY
	Causes the display to go blank.	

b. When depressed, each key will produce a different display. If any segment fails to come on, the front panel is defective, and should be replaced. If any key fails to operate properly, either the interface module or the front panel has a malfunction. When the display test is completed, press the RESTART key. The display will show:

OPERATION  
NORMAL

LEARNING EVENT 3:

LED Indicators.

a. Usually, the performance of status and BITE checks will determine the malfunction and display the problem on the front panel display. If a problem cannot be isolated to a specific module, then the module access panel must be removed, in order to use the LEDs on the aggregate carrier module (A9)(figure 9), transmit processor module (A10)(figure 10), and receive processor module (A11)(figure 11).

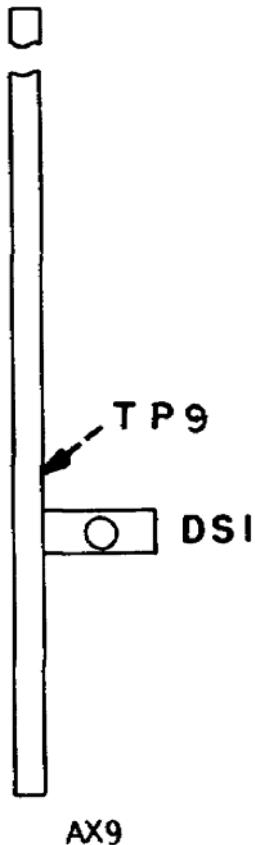


Figure 9. Aggregate Carrier LED Indicator.

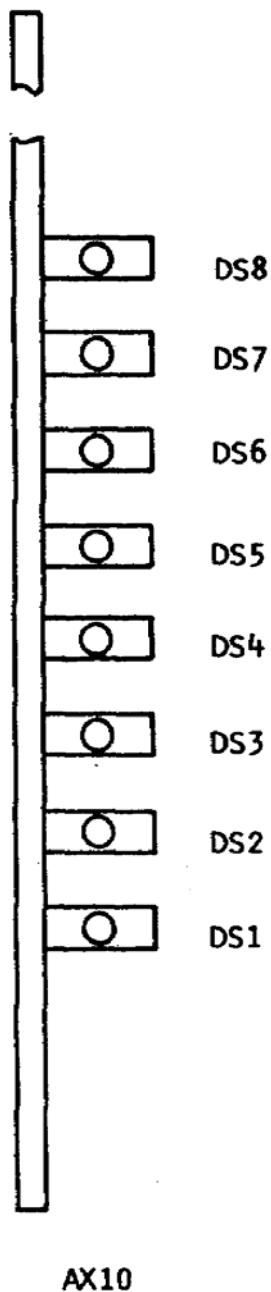
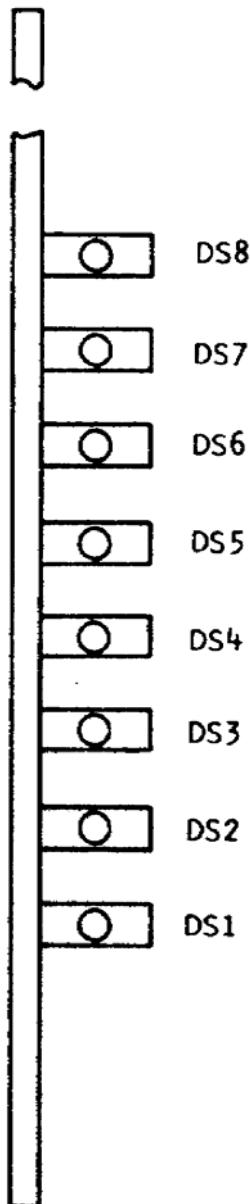


Figure 10. Transmit Processor LED Indicators.



**AX11**

Figure 11. Receive Processor LED Indicators.

b. During normal operation, all the LED indicators on the aggregate carrier, transmit processor, and receive processor modules should be off. If any LED is on, refer to table 2 to identify the malfunction.

Table 2. Interpretation of LED Indicators.

LED ON MODULE	LED	MALFUNCTION	CORRECTIVE ACTION
AX9	DS1	No external clock.	Provide clock or con-figure for internal clock (paragraph 3e, learning event 4, lesson 2, SS9 782-3.)
AX10	DS1	Transmit processor module bad.	Replace transmit processor module (learning event 2, lesson 2, SS9 783-3.)
AX10	DS2	Shared logic module bad.	Replace shared logic module (learning event 2, lesson 2, SS9 783-3.)
AX10	DS3	Port/aggregate rates not correct.	Reconfigure rates (para-graph 3e, learning event 4, lesson 2, SS9 782-3.)
AX10	DS4 thru DS7	Internal failure within transmit processor module.	Replace transmit processor module (learning event 2, lesson 2, SS9 783-3.)
AX10	DS8	Transmit processor and receive processor modules incompatible.	Remove processor module having incorrect version and replace with module having correct version (learning event 2, lesson 2, SS9 783-3.)
AX11	DS1	Receive processor module bad.	Replace receive processor module (learning event 2, lesson 2, SS9 783-3.)

LED ON MODULE	LED	MALFUNCTION	CORRECTIVE ACTION
AX11	DS2	a. Port data over-run or underflow.  b. Clock and rate mismatch.	a. Perform a status check and replace bad port module (learning event 2, lesson 2, SS9 783-3.)  b. Change clock and data rate (paragraph 3e, learning event 4, lesson 2, SS9 782-3.)
AX11	DS3	Port hardware not correct.	Reconfigure port (paragraph 3e, learning event 4, lesson 2, SS9 782-3.) If the malfunction persists, replace port module (learning event 2, lesson 2, SS9 783-3.)
AX11	DS4 thru DS7	Internal failure within receive processor module.	Replace receive processor module (learning event 2, lesson 2, SS9 783-3.)
AX11	DS8	Transmit processor and receive processor modules incompatible.	Remove processor module having incorrect version and replace with module having correct version (learning event 2, lesson 2, SS9 783-3.)

c. BITE. During BITE checks, the LEDs on the processor modules (AX10 and AX11) can also be used to find malfunctions. When the BITE check is started (i.e., as soon as the STORE key is pressed), all eight LEDs on each module will flash. If an LED doesn't flash, either the LED or its driver is bad. Within 5 seconds after the BITE check is started, DS1 through DS5 on the transmit processor module and DS1 through DS7 on the receive processor module will come on. IF a BITE check cannot be performed from the front panel, it is possible to start a BITE check through a jumper strap on the shared logic module. This process is called a forced BITE check.

d. To start a forced BITE check with the jumper strap, follow the steps below.

(1) Turn off power.

- (2) Remove the shared logic module (A12).
- (3) Move jumper strap 6 to B (see figure 12).

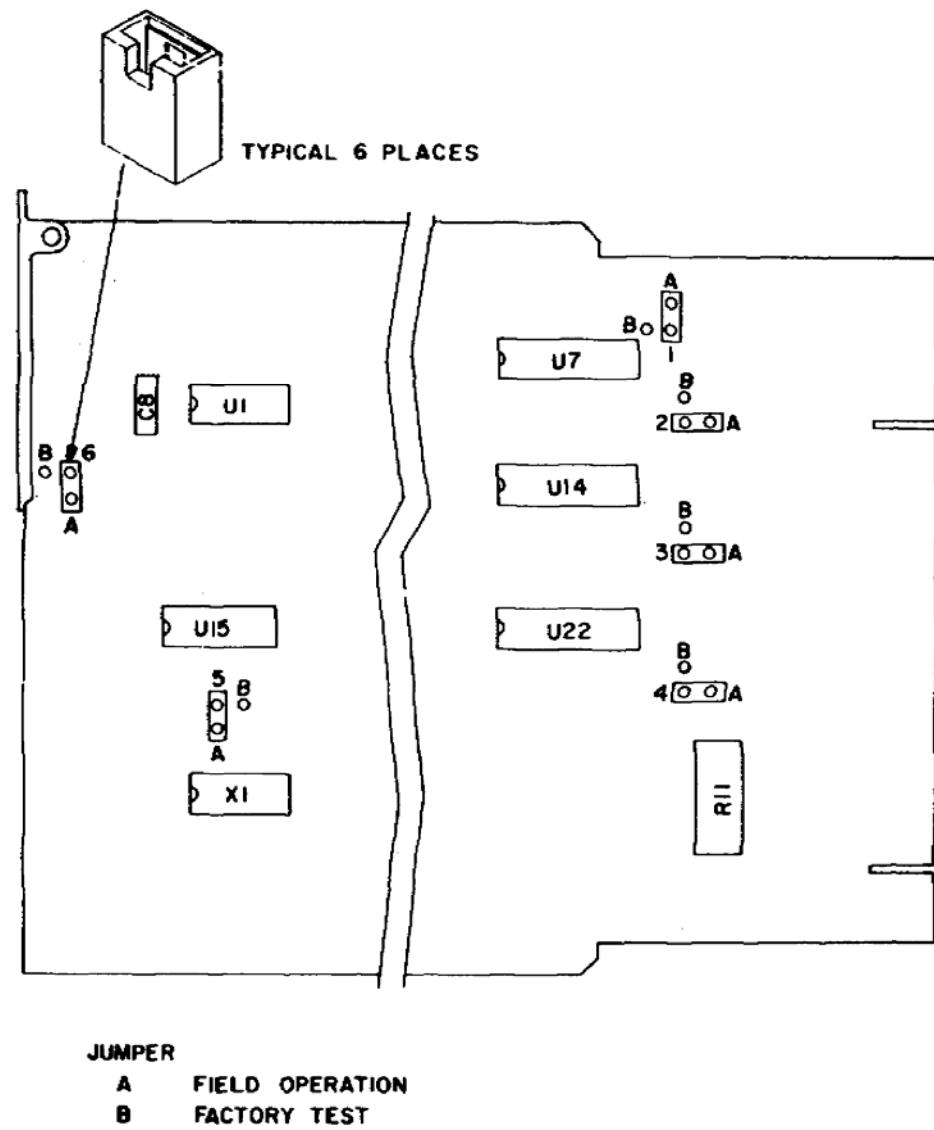


Figure 12. Shared Logic Module (A12) Strapping Options.

- (4) Install shared logic module.
- (5) Apply power.
- (6) Observe the LEDs on the transmit and receive processor modules. If any LEDs fail to come on; refer to table 3.

(7) If all tests pass, replace the front panel module.

(8) After any bad modules have been replaced, return jumper strap 6 on the shared logic module to A.

Table 3. Internal LED Indicators - Forced BITE.

LED OFF		MALFUNCTION	CORRECTIVE ACTION
MODULE	LED		
AX10	DS1 thru DS4	Bad transmit processor module.	Replace transmit processor module (learning event 2, lesson 2, SS9 783-3.)
AX10	DS5	Bad shared logic module.	Replace shared logic module (learning event 2, lesson 2, SS9 783-3.)
AX11	DS1 thru DS4	Bad receive processor module.	Replace receive processor module (learning event 2, lesson 2, SS9 783-3.)
AX11	DS5	Bad shared logic module.	Replace shared logic module (learning event 2, lesson 2, SS9 783-3.)
AX11	DS6, DS7	Bad interface module.	Replace interface module (learning event 2, lesson 2, SS9 783-3.)

LEARNING EVENT 4:

NOTE: The BITE module (A13) is an independent hardware circuit card. This module is not associated with BITE checks manually initiated from the front panel.

1. The BITE module, figure 13, contains LEDs which monitor AN/FCC-100(V) power supply and internal clock signals. The module also employs a plug-in probe and signal LEDs to find bad port, port carrier, aggregate, and aggregate carrier modules.

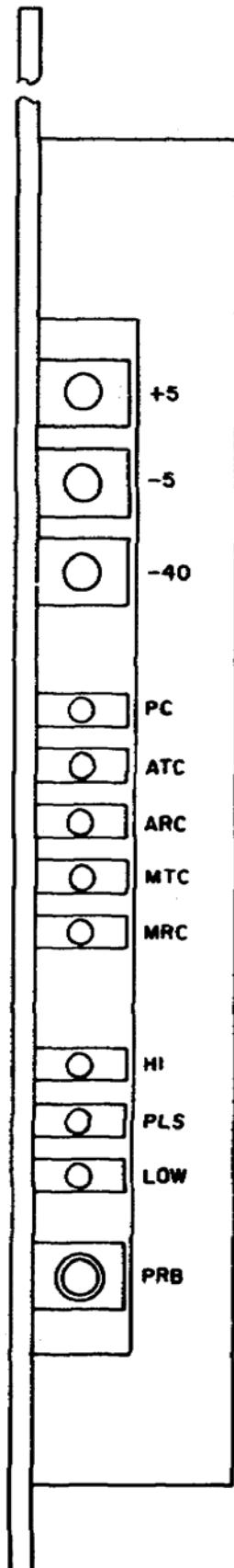


Figure 13. BITE Module (A13).

2. The BITE module contains eight monitor LEDs.

a. Remove the module access panel.

b. Observe the monitor LEDs and refer to table 4.

(1) Power LEDs. The power LEDs are normally on when power is supplied to the AN/FCC-100(V). The power LEDs are marked +5, -5, and -40.

Table 4. Troubleshooting Using BITE Module.

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
+5, -5, and/or -40 LEDs not on.	Bad power supply.	Replace power supply unit (learning event 4, lesson 2, SS9 783-3.)
PC LED is on.	Bad shared logic module.	Replace shared logic module (learning event 2, lesson 2, SS9 783-3.)
ATC LED is on.	a. Bad aggregate carrier module. b. Bad aggregate module.	a. Replace aggregate carrier module (learning event 2, lesson 2, SS9 783-3.) b. Replace aggregate module (learning event 2, lesson 2, SS9 783-3.)
ARC LED is on.	a. Bad aggregate carrier module. b. Bad aggregate module.	a. Replace aggregate carrier module (learning event 2, lesson 2, SS9 783-3.) b. Replace aggregate module (learning event 2, lesson 2, SS9 783-3.)

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
MTC LED is on.	a. Bad aggregate carrier module. b. Bad aggregate module.	a. Replace aggregate carrier module (learning event 2, lesson 2, SS9 783-3.) b. Replace aggregate module (learning event 2, lesson 2, SS9 783-3.)
MRC LED is on.	a. Bad aggregate carrier module. b. Bad aggregate module.	a. Replace aggregate carrier module (learning event 2, lesson 2, SS9 783-3.) b. Replace aggregate module (learning event 2, lesson 2, SS9 783-3.)

(2) The clock LEDs are normally off when the processors are operating normally. The clock LEDs are:

- (a) Processor clock (PC).
- (b) Aggregate transmit clock (ATC).
- (c) Aggregate receive clock (ARC).
- (d) Master transmit clock (MTC).
- (e) Master receive clock (MRC).

3. A probe and three indicator LEDs can be used to read logic levels on module test point. One end of the probe is plugged into the BITE module jack labeled PRB. The other end can be connected to various test points (see figure 14).

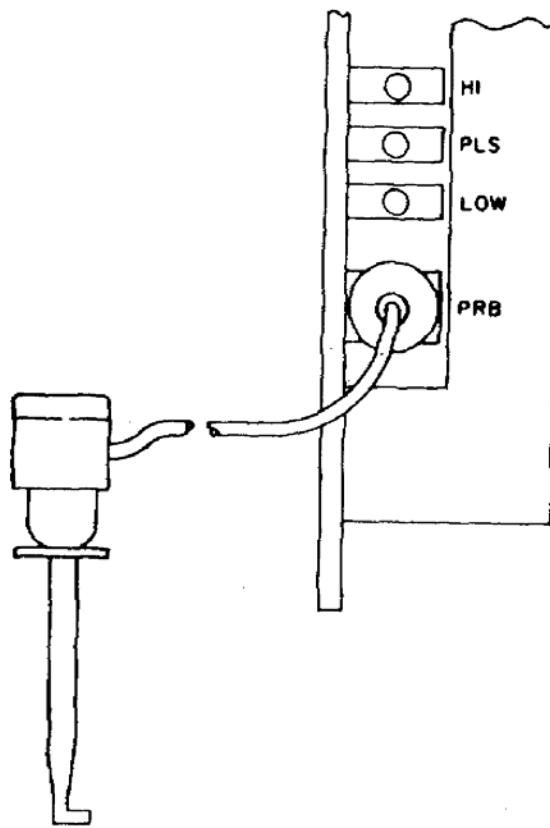


Figure 14. BITE Module Probe and Indicator LEDs.

4. The test point state can be determined by observing the LEDs. The HI LED will come on with the probe input of at least +2.0 volts DC. The LOW LED will come on with a probe input of less than +0.8 volt DC. The PLS LED will come on when the probe is sensing a pulsing signal. If the pulse rate is slow, the PLS LED will flash (the HI and LOW LED may flash also). If the pulse rate is fast, the PLS LED will remain on constantly. The probe and LEDs can be used to identify bad port, port carrier, aggregate, and aggregate carrier modules. To use the probe, follow the steps listed below.

- a. With the probe disconnected, observe that the LOW LED is on. If the LED is not on, replace the BITE module.
- b. Connect the probe plug to the BITE module.

- c. Connect the clip end of the probe to the aggregate carrier module (A9) TP9.
- d. If the PLS LED does not come on, replace the BITE module.

- e. Use the probe to check the port, port carrier, aggregate, and aggregate carrier modules in conjunction with table 5.

NOTE: When using table 5, use figures 15 through 20 for test points locations.

Table 5. Troubleshooting Using BITE Probe.

MALFUNCTION	PLS LED INDICATION	CORRECTIVE ACTION
Diphase port will not pass data.	<ul style="list-style-type: none"> <li>a. No signal at port module TP1.</li> <li>b. No signal at port module TP5.</li> <li>c. No signal at port carrier TP8 (odd port) or TP6 (even port).</li> <li>d. No signal at port carrier module TP4 and TP5 (odd port) or TP1 and TP7 (even port).</li> <li>e. No signal at port carrier module TP3 (odd port) or TP2 (even port).</li> <li>f. No signal at port module TP4.</li> </ul>	<ul style="list-style-type: none"> <li>a. Replace port carrier module.</li> <li>b. Replace port module.</li> <li>c. Replace port module.</li> <li>d. Replace port module.</li> <li>e. Replace port carrier module.</li> <li>f. Replace port module.</li> </ul>
Synchronous port will not pass data.	No signal at port module TP1.	Replace port carrier module.

MALFUNCTION	PLS LED INDICATION	CORRECTIVE ACTION
Isochronous port will not pass data.	<ul style="list-style-type: none"> <li>a. No signal at port module TP2.</li> <li>b. No signal at port module TP5.</li> <li>c. No signal at port module TP1.</li> <li>d. No signal at port carrier module TP8 (odd port) or TP6 (even port).</li> <li>e. No signal at port module TP4, but signal present at port carrier module TP3 (odd port) or TP2 (even port).</li> <li>f. No signal at port module TP4.</li> </ul>	<ul style="list-style-type: none"> <li>a. Replace port carrier module.</li> <li>b. Replace port carrier module.</li> <li>c. Replace port carrier module.</li> <li>d. Replace port module.</li> <li>e. Replace port module.</li> <li>f. Replace port carrier module.</li> </ul>
Aggregate does not transmit data.	<ul style="list-style-type: none"> <li>a. No signal at aggregate module TP3.</li> <li>b. No signal at aggregate module TP1.</li> </ul>	<ul style="list-style-type: none"> <li>a. Replace aggregate module.</li> <li>b. Replace aggregate module.</li> </ul>
Aggregate does not receive data.	<ul style="list-style-type: none"> <li>a. Signal at aggregate module TP4.</li> <li>b. Signal at aggregate module TP5.</li> </ul>	<ul style="list-style-type: none"> <li>a. Replace aggregate module.</li> <li>b. Replace aggregate module.</li> </ul>

NOTE: Table 5 assumes that a transmission problem exists and loopback checks have indicated that the problem is within the AN/FCC-100(V). The table also assumes that BITE reported malfunctions have been corrected.

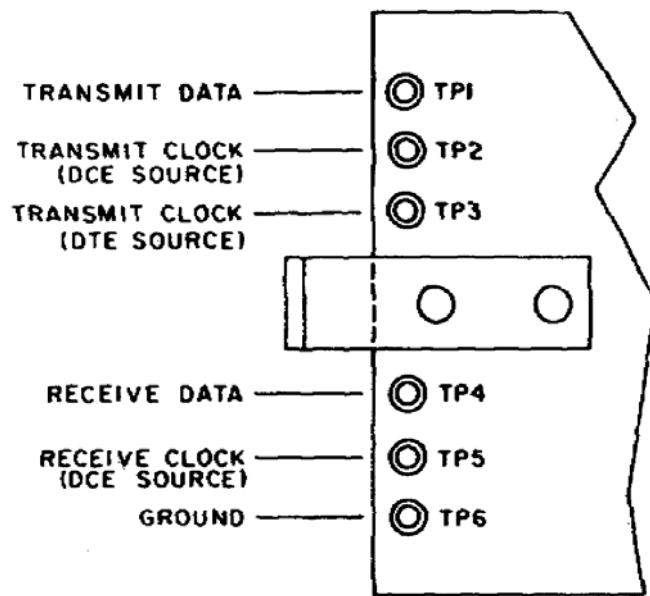


Figure 15. Synchronous Port Module Test Points.

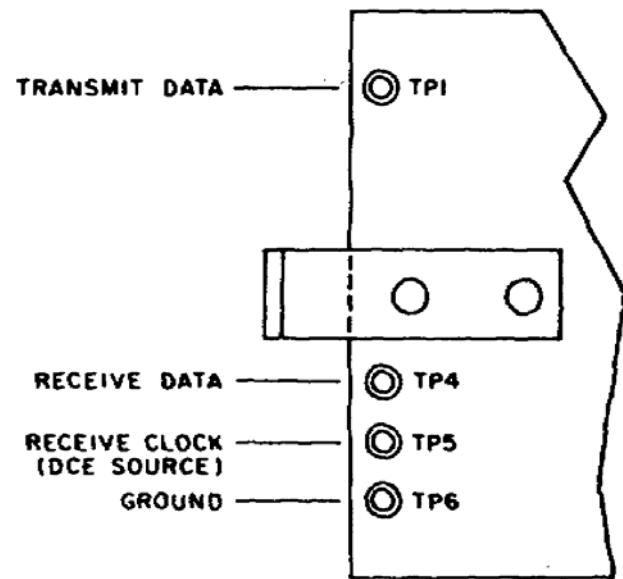


Figure 16. Diphase Port Module Test Points.

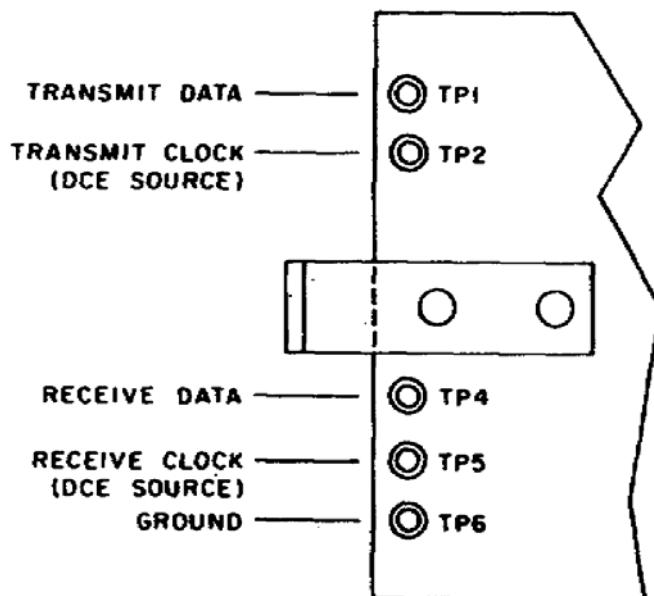


Figure 17. Isochronous Port Module Test Points.

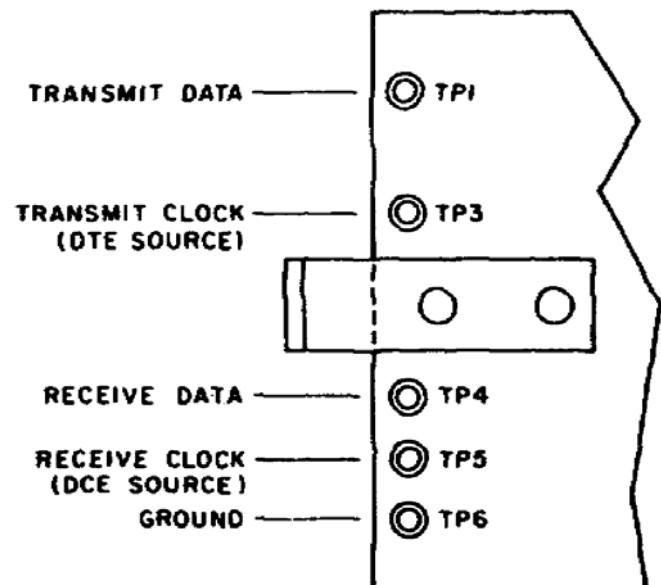


Figure 18. NRZ Aggregate Nodule Test Points.

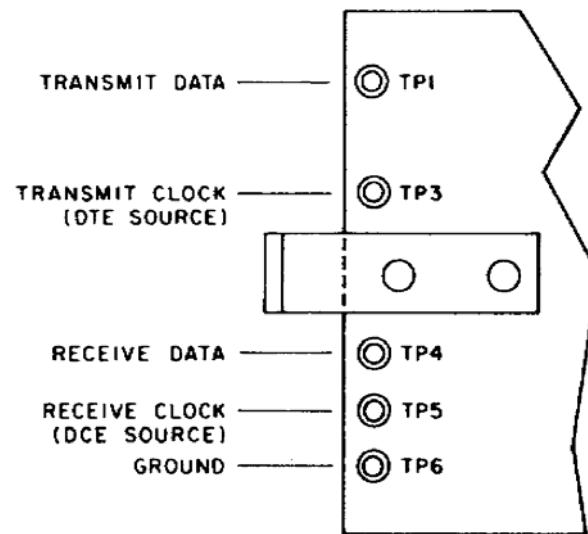


Figure 19. Diphase Aggregate Module Test Points.

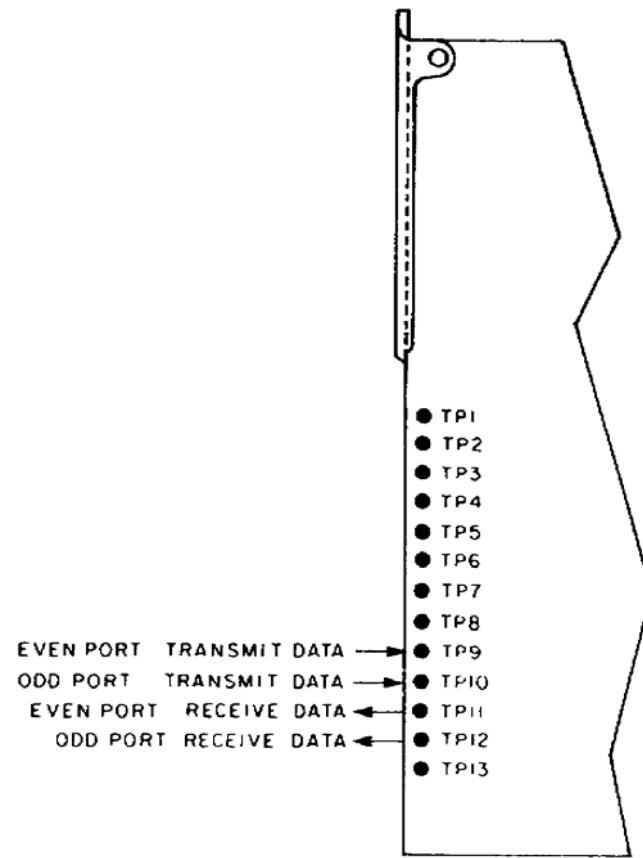


Figure 20. Port Carrier Module Test Points.

## LESSON VERIFICATION 3

### INSTRUCTIONS TO STUDENT:

The following exercise is performance-oriented. You will require close supervision in order to complete this exercise. Prior to completing this exercise, have your supervisor provide you the opportunity to perform the various organizational tasks presented in lesson 3. When you have mastered all the tasks, go ahead and complete the lesson verification. You are authorized to use SOJT Extract A and this subcourse booklet. You must perform three out of four tasks in accordance with steps in SOJT Extract B, to be able to proceed-to the examination. Have your supervisor read the next paragraph.

### INSTRUCTIONS TO SUPERVISOR:

Insure the individual has an operational AN/FCC-100(V) for him to practice the tasks in lesson 3, and that all conditions are met to accomplish these tasks. When he has mastered the performances, have him complete this lesson verification. You will provide him a spare shared logic module for exercise 4. You must monitor every task closely, to insure no mishap occurs. After completing each task, initial where indicated and have him proceed to the next task. At the completion of lesson verification 3, have him view all prior lessons, in order to take the examination.

Perform the following tasks in accordance with steps in lesson 3, SOJT Extract B.

1. Demonstrate the proper procedure to perform a port lookback, in accordance with learning event 3, lesson 1, SOJT Extract A. (Insure port selected is unused.)

SUPERVISOR'S INITIALS \_\_\_\_\_

2. Demonstrate the proper way to perform a status check in accordance with learning event 4, lesson 2, SOJT Extract A.

SUPERVISOR'S INITIALS \_\_\_\_\_

3. Explain the procedure involved in performing a BITE check in accordance with learning event 2, lesson 3, SOJT Extract B.

SUPERVISOR'S INITIALS \_\_\_\_\_

4. Having been issued a spare shared logic module, explain and proceed to demonstrate the proper procedure to create a forced BITE check condition, without necessarily installing the spare module.

SUPERVISOR'S INITIALS \_\_\_\_\_

LESSON VERIFICATION 3 - ANSWER SHEET

1. Learning event 3, lesson 1, SOJT Extract A.
2. Learning event 4, lesson 2, SOJT Extract A.
3. Learning event 2, lesson 3, SOJT Extract B.
4. Learning event 4, lesson 3, SOJT Extract B.

POSTTEST

SIGNAL SUBCOURSE:

SOJT Extract B Organizational Maintenance of Multiplexer Set AN/FCC-100(V)

TEXT ASSIGNMENT:

SOJT Extract B

MATERIALS REQUIRED:

Pencil and paper

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In order to perform this section, you must have a supervisor to assist you. Have him read the following paragraphs.

INSTRUCTIONS TO SUPERVISOR:

Insure the individual to be tested has a copy of SOJT Extract B, SOJT Extract A, pencil, paper, access to an operational AN/FCC-100(V), and a spare shared logic module. You will be present at all times to monitor the individual, during the testing period. You, the supervisor, will be scoring the individual on his ability to accomplish the tasks for a GO or for a NO-GO. To achieve a GO the individual must perform, accurately, three out of the four tasks presented.

At this time provide the individual with a spare shared logic module and have him perform the first two tasks of the posttest.

1. Having been issued a spare shared logic module, set the strapping for field operation in accordance with learning event 3, lesson 2, SOJT Extract A.
2. After having reset the shared logic module's strap to normal position, set shared logic module for a forced BITE check in accordance with learning event 3, lesson 3, SOJT Extract B without installing it.

3. After your supervisor has assigned you an unused port, set up the following configuration, without placing it in the active memory.

PORt # \_\_\_\_\_ (to be selected by supervisor)

NO-LB

SYN

1200

POS-MARK

INT-CLOCK

4. Perform an examine active operation and place the data for each port/aggregate below.

Port 1    Port 2    Port 3    Port 4    Port 5    Port 6    Port 7    Port 8

Port 9    Port 10    Port 11    Port 12    Port 13    Port 14    Port 15    Port 16

When you have completed this examination, notify your supervisor for appropriate action.

POSTTEST - ANSWER SHEET

1. Learning event 3, lesson 2, SOJT Extract A.
2. Learning event 3, lesson 3, SOJT Extract A.
3. Paragraph 3e, learning event 4, lesson 2, SOJT Extract A.
4. Paragraph 3c, learning event 4, lesson 2, SOJT Extract A.